NATIONAL ENVIRONMENTAL POLICY ACT

ENVIRONMENTAL ASSESSMENT REPORT

Naco-Nogales Project

Prepared for

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TABLE OF CONTENTS

NATIONAL ENVIRONMENTAL POLICY ACT 1
ENVIRONMENTAL ASSESSMENT REPORT 1
Naco-Nogales Project 1
TABLE OF CONTENTS 2
EXECUTIVE SUMMARY 3
SECTION 1.0 7
INTRODUCTION 7
1.1 PURPOSE 7
1.2 AGENCY CONSULTATION 8
1.3 PROJECT AND SITE DESCRIPTION 8
1.4 ENVIRONMENTAL REVIEWS IN MEXICO 9
SECTION 2.0 14
DESCRIPTION OF EXISTING U.S. ENVIRONMENT 14
2.1 Land Use 14
2.2 Climatology/Air Quality 16
2.3 Water Resources 18
2.4 Flora and Fauna 20
2.5 Historic, Scenic, Recreation, and Cultural Resources 21
2.6 Noise 23
2.7 Traffic and Transportation 23
2.8 Socio-economic Conditions 24
2.8.1 Demography 24
2.8.2 Economic Activity 24
2.8.3 Housing 26
SECTION 3.0 27
POTENTIAL IMPACT OF PROPOSED PROJECT ON THE UNITED STATES 27
3.1 Land Use 27
3.2 Air Quality 27
3.3 Water Resources 31
3.4 Flora and Fauna 31
3.5 Historic, Scenic, Recreation, and Cultural Resources 31
3.6 Noise 32
3.7 Traffic and Transportation 32
3.8 Socio-economic Impacts 33
3.8.1 Demography 33
3.8.2 Economic Activity 33
3.8.3 Housing 33
SECTION 4.0 34
CONCLUSIONS 34
SECTION 5.0 35
REFERENCES 35
APPENDIX A 38
AIR QUALITY ANALYSIS 38

EXECUTIVE SUMMARY

This National Environmental Policy Act Environmental Assessment Report assesses impacts of construction and operation of the proposed Naco-Nogales power plant (the "project") in Agua Prieta, Sonora, Mexico on the environment of the United States. The report provides analysis of the potential environmental affects of the project on the United States to ensure that there are no significant adverse impacts prior to issuance of final commitment for financing of the Naco-Nogales project by Export-Import Bank of the United States ("Eximbank").

The Naco-Nogales project is a combined cycle power plant with a capacity of 300 MW±10 percent. The power plant will be located on a 74-acre site 8.7 miles southwest of the city of Agua Prieta, Sonora, Mexico in an area called "El Fresnal". The shortest distance to the U.S border to the north is approximately 7.5 miles. It will be fueled by natural gas. There is no backup fuel. Water for service and process water will be provided from the city of Agua Prieta's sewage lagoons via a 6.5-mile pipeline. Water discharge from the plant will be returned to the Agua Prieta River, at or about the point of withdrawal.

The Environmental Assessment ("EA") has been prepared in accordance with National Environmental Policy Act requirements. The EA reviews potential impacts of the Naco-Nogales project on land use, air quality, water resources, flora and fauna, scenic, historic, and cultural resources, noise, traffic, and socio-economic conditions and concludes that **there are no significant adverse impacts on the environment of the United States.**

The area of the United States closest to the Naco-Nogales project is the southernmost region of Cochise County, in southeastern Arizona. The EA looks specifically at environmental resources in this area. The city of Douglas, Arizona, with a population of 14,312 people, is the closest U.S. population center to the project. Because the project is

physically outside the borders of the United States, there is generally little or no direct impact on the U.S. environment due to the construction and operation of the plant. Specific attention was given to potential non-land based impacts, such as air and water, and on resources where there may be project induced affects, such as socio-economic resources.

Analysis of potential land use impacts found no significant adverse impacts. Southern Cochise County is a predominantly rural area and there are no indications that the project's development would change this land use. County Zoning has designated growth areas that are fully able to accommodate additional growth should the project stimulate additional growth in the County.

Stone & Webster performed an air quality analysis to assess potential adverse impacts on air quality in the U.S(Appendix A). The analysis includes an assessment of potential air quality impacts on the Chiricahua National Monument and the Chiricahua Wilderness Area, two Class I areas designated by that Clean Air Act that are located within 100 km of the project. If the project were being developed in the United States, the developer would need to consult with the Federal Land Manager for the Class I area prior to being issued an air permit in the United States[1]. The air quality analysis found no significant impact on the two Class I areas. The air quality in Cochise County is also designated as non-attainment for sulfur dioxide SO_2 and particulates (PM-10). The analysis found that the project impacts were below the significant impact levels for these pollutants. It also found no adverse impacts on the air quality for people living in the city of Douglas.

Review of the potential project impacts on water resources in the U.S. found no

[1] Class I areas are designated by the Clean Air Act of 1977 and include international parks; national wilderness areas (including certain national wildlife refuges, national monuments and national seashores) which exceed 5,000 acres in size; national memorial parks which exceed 5,000 acres in size; and national parks which exceed 6,000 acres in size. Section 165 of the act requires the EPA or the state permitting authority to notify the federal land manager, such as the park superintendent or refuge manager, if emissions from a proposed project may impact a Class I area. The notification includes the applicant's air permit application. This allows the federal land manager to review the application concurrently with the permitting authority. The permitting authority should notify the federal land manager of all major facilities proposing to locate within 100 km (62 miles) of a Class I area.

significant adverse impact. Southern Cochise County is located in the southern end of Sulphur Springs Valley. Surface water and groundwater in the valley flow in a southeast direction across the U.S./Mexican border. The project uses surface water from the city of Agua Prieta's sewage lagoons and discharges water back to the Agua Prieta River. These withdrawals and discharges occur downstream and down gradient of water resources in the United States, therefore, there are no impacts on the United States water resources.

There are no project impacts on flora, fauna, historic, scenic, recreational, or cultural resources. The project's location 7.5 miles south of the U.S./Mexican border precludes direct project impacts on terrestrial habitat for flora and fauna. Aquatic habitats are not affected, because surface water flow affected by the project is away from United States. There are 72 listing on the National Register of Historic Places in Cochise County. These are primarily buildings and structures that will not be affected by the project.

The project will be visible from a distance across the U.S./Mexican border. Southern Cochise County is a place of significant natural beauty, but there are no designated scenic outlooks in the U.S. from which the project will be visible and the project's distance from the border minimizes its overall visual appearance. Other built elements in the landscape, including a limestone quarry immediately to its west, are of similar visual profile. Recreation areas in Cochise County, including the Coronado National Forest and San Bernadino National Wildlife Refuge are unaffected by the project because of there distance from it. Air quality analysis found no impact on the Chiricahua National Monument or Chiricahua Wilderness Area in the Coronado National Forest.

There will be no adverse impacts on the United States due noise or traffic. The project distance of 7.5 miles from the U.S./Mexican border allows sufficient distance to attenuate any noise associated with the operation of the plant. The greatest potential impact on traffic associated with the project is that induced by the employment of up to 667 construction workers during peak construction. The construction workers will be Mexicans; therefore, all project construction associated traffic will be in Mexico. Furthermore, there is sufficient roadway infrastructure on the U.S. side of the border to

handle any increase in traffic flow.

The project has either no adverse impact or a positive impact on socioeconomic conditions in Cochise County. Since the project is located in Mexico and will employ Mexican workers, there is no affect on the housing or demographics in Douglas or Cochise County. The project should have a positive impact on the economy of Douglas due to the jobs provided for the construction and operation of the plant. Market research shows that 30 to 40% of the retail sales in Douglas come from Mexican consumers, the majority of whom work in well paying jobs in industrial plants south of the border.

SECTION 1.0

INTRODUCTION

1.1 PURPOSE

This National Environmental Policy Act Environmental Assessment Report ("EA") summarizes the impact on the environment of the United States of the Naco-Nogales power plant project, which is located in Agua Prieta, Sonora, Mexico, about 7.5 miles due south of the U.S./Mexican border. It was prepared by Stone & Webster Consultants, Inc. ("Stone & Webster"), as technical consultants to project lenders, including the Export-Import Bank of the United States (Eximbank).

The EA assesses project impacts on the environment of the United States in accordance with procedures set forth in 12 CFR Part 408, "Procedures for Compliance with the National Environmental Policy Act." These procedures are applicable to cases where Eximbank financing of exports may affect environmental quality in the United States. Environmental impacts have been assessed based on guidance provided by the Eximbank Engineer and appropriate United States agencies.

Various lenders, including Eximbank will provide funding for the project. The project will comply with all specified limits established by Mexican regulatory agencies as outlined in Section 1.3 of this report and Table VI of Eximbank's Environmental Procedures and Guidelines as revised April 2, 1998 and extended April 2, 2001.

The need for the additional electrical generating capacity in Mexico was determined by the Mexican Comisión Federal de Electricidad ("CFE"). The project was undertaken to satisfy the demand for electricity in Mexico. There are no plans for the project to sell electricity to the United States. Furthermore, the transmission grid in Mexico is

insufficient to support transmission to the U.S.. The existing transmission lines between Douglas, Arizona and Agua Prieta are designed so that they only allow electric transmission from the U.S. to Mexico and not from Mexico to the U.S..

A more detailed assessment of the status of permits required under Mexican jurisdiction, which is the responsibility of CFE, will be provided in a separate report. CFE's site selection process includes consideration of site alternatives. The Naco-Nogales site was selected after screening an initial list of 16 possible locations. Site screening is driven by selecting a project location that has the least impact on the environment.

1.2 AGENCY CONSULTATION

Stone & Webster Consulted with the following local, state, county, and federal agencies during the preparation of this report: the city of Douglas Planning Department, the city of Douglas Department of Public Works, the Cochise County Planning Department, the U.S. Forest Service, and the U.S. National Park Service. Information used in the preparation of the report was also obtained from the Arizona Department of Water Resources, the Air Quality Division of the Arizona Department of Environmental Quality, and the U.S. Environmental Protection Agency.

1.3 PROJECT AND SITE DESCRIPTION

The proposed Naco-Nogales project is a combined cycle power plant with a capacity of 300 MW±10 percent. Condenser cooling will provided by a wet mechanical draft cooling tower. The power plant will be located on a 74-acre site 8.7 miles southwest of the city of Agua Prieta, Sonora, Mexico in an area called "El Fresnal". The shortest distance to the U.S border to the north is approximately 7.5 miles. It will be fueled by natural gas. Water for service and process water will be provided from the city of Agua Prieta's sewage lagoons via a pipeline. The 74-acre site has two parts. Thirty-three acres will be covered by the power plant and 41 acres will be covered by an electric substation owned by CFE. Another 26 acres will be used for the installation of a 6.5-mile water supply pipeline between the city of Aqua Prieta's sewage lagoons and the site. A pump station will be constructed adjacent to the sewage lagoons and water to the plant will be

delivered via a 10 to 12 inch diameter pipeline that will be constructed and buried within a 33-foot right-of-way. A paved, 2.2-mile access road will be constructed from Mexico Route 17 to the property. The project includes a wastewater treatment facility that will treat the water transferred via pipeline to the plant. Water from the plant will be discharge to the Agua Prieta River via a pipeline that parallels the water supply pipeline.

The site of the power plant is currently vacant land of irregular topography standing at an elevation of 4133 feet above mean sea level (AMSL). It is in the Sonora Desert Sub-province of the Sierras Sepultadas Province. The predominant land cover is desert scrub. The land surrounding the site is in private ownership and *ejido* land[2] and is used either for ranching or agriculture. The El Fresnal Ranch is located to the Southeast and Southwest. Northeast of the property is the Ejido Agua Prieta. Northwest of the property is La Calera, which is owned by Mexicana de Cobre S.A.. There is a small municipal airstrip just to the north of the site, which services private single engine planes. With the exception of the city of Agua Prieta located to the northeast, the land within a 15km (9.3 mile) radius of the property is predominantly vacant. There is a limestone mine located west of the site where limestone is being mined from the north face of the mountain.

The terrain in the immediate site area is relatively flat but there are hills 2 miles to the southwest of the site that rise approximately 1600 feet above the base elevation of the plant. These hills are confined within Mexico with the terrain dropping off to an elevation similar to that of the site at the U.S.-Mexican border to the north.

The project will employ an estimated 667 workers during construction and 66 workers during operation. It is currently scheduled for completion in March 2003.

1.4 ENVIRONMENTAL REVIEWS IN MEXICO

The environmental impacts of the project are subject to review and permitting requirements within Mexico. The Mexican government, through the Secretaría Medio

[2] *Ejido* is land held in common by a peasant community. It is neither private nor public land.

Ambiente, Recursos Naturales y Pesca ("SEMARNAP" - Environment, Natural Resources, and Fisheries Secretary) has exclusive jurisdiction over the development of national policy on environmental matters; resolution of environmental issues affecting two or more states or another country; regulation of high risk activities including management and disposal of hazardous materials and wastes; and enforcement of federal environmental regulations. Non-federal issues and environmental matters will be under the jurisdiction of the respective states and municipalities. The policies of the states and municipalities must meet or exceed federal requirements.

There are three decentralized organizations under SEMARNAP:

> The *Instituto Nacional de Ecologia* ("INE" - National Institute of Ecology) is responsible for the development of environmental policies and regulations, and the issuance of permits and licenses, including review and authorization of Environmental Impact Assessments (EIA).
>
> The *Procuraduria Federal de Protección al Ambiente* ("PROFEPA" - Office of Attorney General for Protection of Environment) is the primary federal agency authorized to enforce environmental laws in Mexico, including the regulations for the management and disposal of hazardous and industrial waste, air emission, and water pollution.
>
> The *Comisión Nacional del Agua* ("CNA" - National Water Commission) is responsible for issuing permits for water withdrawal from and discharge to federally chartered bodies of water (such as rivers and lakes).

The General Law of Ecological Equilibrium and Protection of the Environment ("Ecology Law" hereafter) was passed in 1988 and established the overall framework for industrial requirements and associated fines and penalties for noncompliance. In 1996, the Ecology Law was revised to simplify procedures, improve the enforcement, and clarify responsibilities for specific federal, state and municipal jurisdictions. The

Ecology Law and associated regulations require that for certain projects an Environmental Impact Assessment ("EIA") ("Manifiesto de Impacto Ambiental") be prepared and approved by INE. Depending upon the project, there are three levels of EIA: general, intermediate, or specific (most detailed). In addition to the EIA, for projects with potential "high" risks a Risk Study ("Estudio de Riesgo") must also be prepared and approved by INE. Upon issuing an authorization (approval) for the EIA, INE usually sets forth specific conditions that must be met by the project during construction, operation, and abandonment. These conditions commonly establish requirements for mitigating environmental impacts of the project. Associated with the Ecology Law and related regulations, more than 250 environmental standards (known as NOMs) have been established by INE and CNA to regulate areas in air emission, wastewater discharge, hazardous waste, etc.

Article 28 of the General Law of Ecological Equilibrium and Protection of the Environment specifies that power projects fall within federal jurisdiction. Therefore, INE in Mexico City is responsible for reviewing the environmental impact evaluation and issuing the Authorization of Environmental Impact and PROFEPA in Mexico City is responsible for monitoring compliance with the Authorization.

The Mexican Comisión Federal de Electricidad ("CFE") conducted the initial site selection and had an Environmental Impact Analysis Report prepared for the site and the plant. CFE then chose Fuerza y Energia de Naco-Nogales (FENN) as the successful bidder to develop the project.

El Paso - Mexico is responsible for the design and environmental studies associated with the gas pipeline that will provide fuel to the plant. It intends to use natural gas supplied by El Paso Merchant Enegery Gas, L.P. ("El Paso") by extending a pipeline that now runs to the Mexican/U.S. border.

The EIA included a risk assessment and was prepared by the Centro de Investigaciones Biolgicas del Noroeste, S.C. and Universidad de Sonora for CFE. The Authorization of

Environmental Impact (D.O.O. DGOEIA–001587) was granted by INE on August 5, 2000. This authorization, which includes the elements financed the by the Eximbank, covers the power station, the access roads, and the water supply and wastewater discharge pipelines. It does not include the natural gas pipeline, the adjacent substation or the electrical transmission line(s). El Paso is responsible for permitting and construction of the natural gas pipeline, while CFE is responsible for permitting and construction of the adjacent substation and electrical transmission line(s). These are not part of the project as financed by the Eximbank are therefore outside the scope of this EA.

Figure 1. Site Locus

SECTION 2.0

DESCRIPTION OF EXISTING U.S. ENVIRONMENT

This Section describes the existing conditions of the environment in the United States that could potentially be affected by construction and operation of the plant in Agua Prieta 7.5 miles south of the border. The EA describes the potential environmental impacts in Cochise County in the southeastern corner of Arizona, the area in the United States closest to the power plant (See Figure 1). Cochise County covers a land area of 6,219 square miles. The EA focuses on the area in southern Cochise County within a 25-mile radius of the plant and up to 17 miles north of the U.S./Mexican border. Air quality analysis extends out 60 km (37 miles) to include the evaluation of potential air quality impacts on the Chiricahua Wilderness area. The impacts of the El Paso gas pipeline on the U.S. are not part of the scope of this EA. An Environmental Assessment for the pipeline was prepared separately by the Federal Energy Regulatory Commission (CP99-322-000 and CP99-323-000) and issued February 9, 2000.

2.1 Land Use

The land in southern Cochise County, Arizona is predominantly rural, with scattered ranches and farms. Much of the land in the county is State Trust land or is owned and controlled by federal agencies, such as the Bureau of Land Management, the U.S. Forest Service, or the U.S. military. Douglas, Arizona, with a population of 14,312, is the most densely populated area located immediately over the border from Agua Prieta. Sierra Vista, the largest city in the County with a population of 37,775 is located approximately 46 miles northwest of Douglas and 16 miles north of the border

State Route 80 and U.S. Highway 191 are the major transportation corridors through the area. State Route 80 runs east to west roughly parallel with the U.S./Mexican border. U.S. Highway 191 runs north to south through the center of Sulfur Springs Valley.

Development along the roads in southern Cochise County is confined to Douglas and the unincorporated town of Pirtleville, which is located near the junction of State Route 80 and U.S. Highway 191. Other named places consist of no more than several buildings with a local gas station and perhaps an eating establishment.

The area between State Route 80 and the Mexican border is heavily patrolled by U.S. Border Patrol guards who use four-wheel drive vehicles and portable observation towers to actively survey the area. The land between State Route 80 and the Mexican border west of Douglas is the former site of the Phelps-Dodge reduction works. It was closed in 1987 and all the buildings were removed in 1990. At that time 15.6 million tons of soil from the smelting site were removed. The remaining soil was tested for heavy metals and found to meet Health Based Guidance Levels. All that remains is a 200-acre slag pile left from the smelting operations. A municipal landfill is located near the former reduction works site. There is one active mine in the area, a limestone mine located about 10 miles west of Douglas at Paul Spur. The Bisbee-Douglas International Airport (a two-runway with a flight school that services primarily single engine, general aviation aircraft), is located 10 miles north of the border. Agriculture is a significant land use in Cochise County. There were 824 farms in the County in 1997. These are primarily livestock farms (59%) with a smaller percentage of vegetable and produce farms.

Land in Cochise County is zoned by county government in three general categories: Rural, Residential, and Commercial Industrial. The majority of the land is unincorporated. Ninety percent of the unincorporated land is zoned as Rural with minimum lot sizes for single and multi-family housing ranging from 2 acres to 36 acres. In addition to zoning, in 1996, the Board of Supervisors revised the Cochise County Comprehensive Plan County to designate growth areas that are intended to promote orderly and well-planned future development throughout unincorporated areas of the county. The Plan delineates four growth categories (Categories A – D)[3] that describe the existing and expected intensity of growth of an area. The land around Douglas and Naco

[3] The categories are as follows: Category A – Intensive Growth Areas; Category B – Urban Growth Areas; Category C –Rural Growth Areas; and Category D – Rural Areas.

are designated as a Category B Urban Growth Area. The area around the Bisbee-Douglas International Airport, the Bisbee Municipal Airport, and an area near Double Adobe are designated as Category C Rural Growth Areas. Growth Areas B and C are areas that are designated to accommodate more densely developed land in the future.

2.2 Climatology/Air Quality

The climate of Cochise County is characteristic of the dry desert climate of the Rio Yaqui Basin. On average, the annual rainfall totals average 11 to 13 inches. The average annual relative humidity is 30%. Cochise County is in the Southeast Arizona Interstate Air Quality Control Region. The County is designated by the Environmental Protection Agency ("EPA") as a non-attainment area for sulfur dioxide ("SO_2") and particulates (PM-10 or pollutants particulate matter with aerodynamic diameter less than a nominal 10 micrometers). The EPA designates areas of non-attainment for six "criteria' pollutants if the ambient air concentrations of these pollutants exceed the National Ambient Air Quality Standards ("NAAQS").[4] The County currently meets the NAAQS (i.e., is an attainment area) for ozone ("O_3"), nitrogen dioxide ("NO_2"), carbon monoxide ("CO"), and lead.

The background air quality for SO_2, particulates, CO, ozone, and NO_2 in southeast Arizona caused by existing sources of air pollution in the region is presented in Table 1.[5] Ambient air quality monitoring data on the criteria pollutants in southeast Arizona are available from a monitoring network operated by the Air Quality Division of the Arizona Department of Environmental Quality ("ADEQ"). Monitoring data are collected at several sites within Cochise and Pima Counties (the county immediately west of Cochise County). The monitoring stations that are the most representative of the area in which the maximum project impacts occur in the U.S. are the Douglas monitor (PM-10), the Tucson (Pima County) monitors (NO_2, SO_2, CO) and the Chiricahua National Monument monitor

[4] NAAQS sets threshold concentrations for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead.

(ozone). The highest monitored annual and short-term concentrations (1, 3, 8, and 24 hours) for the period 1998 - 2000 are provided in Table 1 along with the NAAQS for the criteria pollutants considered.

TABLE 1
AMBIENT AIR QUALITY MONITORING DATA FOR
COCHISE AND PIMA COUNTIES

Pollutant	Averaging Interval	Highest Observed Value (ug/m^3)			NAAQS (ug/m^3)
		1998	1999	2000	
SO_2[1]	Annual	2.6	2.6	5.2	80
	24-hour	13.0	13.0	20.8	365
	3-hour	41.6	31.2	28.6	1,300
PM-10[2]	Annual	33.0	35.2	33.7	50
	24-hour	105.0	83.0	95.0	150
CO[1]	8-hour	4,571	4,800	5,714	10,000
	1-hour	8,914	9,714	10,170	40,000
O_3[3]	1-hour	159	161	153	235
NO_2[1]	Annual	32	34	32	100

Notes:
1. SO_2, NO_2 and CO values are the highest from among the monitoring stations in Tucson, Pima County. ADEQ does not collect this data for Cochise County.
2. PM-10 monitoring data are from Douglas in Cochise County.
3. O_3 monitoring data are from Chiricahua National Monument.

There are two Class I areas within 100 km of the Naco-Nogales site. These are the Chiricahua National Monument, whose nearest border is approximately 80 kilometers northeast of the plant, and the Chiricahua Wilderness Area, whose nearest border is approximately 60 kilometers northeast of the plant. Federal Class I land includes areas such as national parks, national wilderness areas and national monuments and is granted special air quality protections under the Clean Air Act. All areas not designated as Class I areas are designated as Class II areas.

Historically, Cochise County's air quality was significantly affected by the Phelps

[5] Background data for lead was not collected or considered in the EA because natural gas fired plants are not a source of lead emissions.

Douglas Reduction Works (a copper smelting plant), which was located on a 2,000 acres site about 1 mile west of Douglas. In 1989, the Arizona Air Quality Office reported that the Reduction Works emitted 450 tons per day of sulfur dioxide in 1984 and, 308,000 tons per year ("TPY") in 1985 and 247,600 TPY in 1986 from two 600-foot stacks. Phelps Douglas Reduction Works closed permanently in 1987 and the smelter facility was demolished and removed in 1990. (Reference 4)

Air quality in Cochise County is affected by activities in Mexico. The average annual wind speed is 8.3 mph and from the southeast out of Agua Prieta, Sonora, Mexico; winds shift and blow towards Mexico in the evening. Dry surface soils and the unpaved roads in Agua Prieta, combined with windy and dry weather conditions, generate moderate to heavy amounts of ambient dust that is blown toward Douglas. This fugitive dust contributes to Cochise County's non-attainment status for particulates (PM-10).

2.3 Water Resources

The principal water resource in southern Cochise County is the Douglas basin, an alluvial valley 35 miles long and 15 miles wide covering an area of about 750 square miles in southeastern Arizona (See Figure 1). It trends under Sulphur Springs Valley in a northwest/southeast direction and is bounded on the east by the Swisshelm (elevations to 7,185 feet), Pedrogosa, and Perilla Mountains (elevations to 6,390 feet), on the west by the Mule and Dragoon Mountains, and on the south by the U.S./Mexican border. An arced series of small, unnamed hills extending from near Pearce, Arizona, to the Swisshelm Mountains form the basins northern boundary. The valley slopes down from elevations ranging from 4,350 feet AMSL in the northern hills to 3,900 feet AMSL at U.S./Mexican border.

Precipitation in these mountains is the main source of groundwater recharge in the Douglas basin. High evaporation rates and impermeable clay and caliche soil layers impede downward percolation of water so that neither rainfall nor irrigation water on the

valley floor are recharged to the groundwater. Streambed infiltration along the course of White Water Draw and ephemeral washes in the valley contribute only a small amount of recharge.

The alluvium is a minimum of 1,600 feet thick in the central valley; but gets shallower along the mountain fronts. The groundwater flow direction is from the mountain highlands toward the central portion of the valley, and then south into Mexico. Groundwater pumping does create cones of depression in the natural flow. In Douglas there is a shift in gradient to the southeast and toward the city's water supply wells.

Most groundwater pumped in the Douglas basin is used for irrigation. Livestock and domestic withdrawal is minor except near Douglas, Arizona, where withdrawal by the city of Douglas for domestic use is significant. The city is totally dependent on ground water for its public water supply and operates eight wells with yields ranging from 800 to 1500 gallons per minute ("GPM"). Since the late 1940's, the Douglas basin has been severely overdrafted. This is largely attributed to demands from agricultural irrigation. In 1965, the State Land Commission declared much of the basin's central valley a Critical Groundwater Area due to large water level declines associated with the severe overdraft conditions. The Commission prohibited drilling new irrigation wells except to replace existing wells. The Critical Groundwater Area became the Douglas Irrigated Non-Expansion Area ("INA") with the passage of the 1980 Groundwater Code.

The Arizona Department of Water Resources reports that the chemical quality of groundwater is considered suitable to marginal for most uses, including irrigation and domestic water supply. Groundwater samples taken from the main aquifer between 1987 and 1990 show elevated levels of fluoride (an inorganic chemical regulated by the EPA's National Primary Drinking Water Standards) and total dissolved solids ("TDS") (a contaminant listed in the EPA's National Secondary Drinking Water Regulations). Fluoride concentrations averaged 1.1 mg/l, however, the highest concentrations (up to 8.5 milligrams per liter ["mg/l"]) makes the water marginal for use as drinking water (EPA's maximum primary contaminant level for fluoride in drinking water is 4.0 mg/l. The

secondary standard for fluoride in 2.0 mg/l.). Fluoride concentrations in the city of Douglas's wells average about 2.0 mg/l. One well reaches as high as approximately 3 mg/l, but since the withdrawal from the city's eight wells is blended, the city has no difficult meeting the primary drinking water standards. Samples collected from the groundwater for TDS showed an average concentration of 390 mg/l (500 mg/l is the EPA's recommended secondary maximum contaminant level TDS).[6]

White Water Draw is the only surface water in the Sulphur Springs Valley. Surface water flows primarily in response to seasonal rain events. Monsoon-like rains can create flash flood conditions, but for the balance of the year there is little or no surface water flow. Hence, flow volumes vary greatly in the river. During drought the river flow is non-existent; during the rainy season large volume flows are present. Flow data at the Douglas Station on the White Water Draw (the name changes to Rio Agua Prieta when it crosses the border into Mexico) shows a maximum flow of 3,019 cubic feet per second ("cfs"). However, average maximum flows are only 14 cfs. Minimum average flows are less than half a cubic foot per second (0.28 cfs). Records from the 1960-1995 show a dry river 45.8% of the time in Mexico just upstream of the Agua Prieta sewage lagoons. The drought season lasts an average of 5.5 months from January to June.

Discharges from the Douglas, Arizona municipal sewage treatment plant contribute significant flow in the White Water Draw/Rio Agua Prieta just as it crosses the border. The plants maximum capacity is 2.6 million gallons per day ("MGD"). Peak discharge is 2.1 MGD. The average discharge is 1.7 MGD. Low flow discharge is 1.1 MGD. The Agua Prieta sewage lagoons discharge 143 ("lps") or 3.26 MGD further downstream.

2.4 Flora and Fauna

There are two National Wildlife Refuges ("NWRs") located in Cochise County. San Bernardino NWR is located 17 miles east of Douglas along the United States/Mexico

[6] Secondary standards are set for contaminants that may affect the taste, color, and/or odor of a drinking water supply. They are not considered to present a threat to human health at the secondary maximum contamination level.

border. Leslie Canyon NWR is located approximately 16 miles north of Douglas at the southern end of the Swisshelm Mountains. The 2,309 acre San Bernardino NWR was acquired by the U.S. Fish and Wildlife Service in 1982 to protect the water resources of the San Bernadino Valley and provide habitat for endangered and threatened native fishes such as the Yaqui chub, Yaqui topminnow , Yaqui beautiful shiner and Yaqui catfish. More than 270 species of birds can be seen at San Bernardino NWR, including great blue heron, green-backed heron, Virginia rail, ringneck duck, Mexican duck, sandhill crane, magnificent hummingbird, Costa's hummingbird, yellow warbler, blue grosbeak, phainopeplas, white-crowned sparrows, and Gila woodpeckers. Raptors include gray hawk, zone-tailed hawk, golden eagle, Swainson's hawk, kestrel, sharp-shinned hawk, and peregrine falcon. Reptiles are also commonly observed including the Sonoroan whipsnake, western diamondback rattlesnake, black-tailed rattlesnake, Chiricahua leopard frog, Gila monster, Madrean alligator lizard, checkered and Mexican garter snakes and horned toad.

Leslie Canyon NWR is located approximately 16 miles north of Douglas at the southern end of the Swisshelm Mountains. This 2770-acre refuge was established in 1988 to protect habitat for the endangered Yaqui chub (*Gila purpurea*) and Yaqui topminnow (*Poeciliopsis occidentalis sonorensis*). The refuge also protects a rare velvet ash-cottonwood-black willow gallery forest.

Mammals found in both the San Bernardino and Leslie Canyon NWRs include mule deer, whitetail deer, javelina, mountain lion, raccoon, coyote, bobcat, gray fox, antelope ground squirrel, badger, jackrabbit, cottontail rabbit, kangaroo rat, and coatimundi. None of these are listed as threatened or endangered by the U.S. Fish and Wildlife Service.

2.5 Historic, Scenic, Recreation, and Cultural Resources

Cochise County is an area rich in historic, scenic, recreation, and cultural resources. Much of the early history is tied to the early Native American settlements in the area. Place names like Cochise, Apache and Chiricahua reflect that history. The nearby Coronado National Forest with the Chiricahua Wilderness Area, the Chiricahua National Monument, and the San Bernadino National Wildlife Refuge are recreation destinations for tourists. Mining is also a significant part of the area's history and culture. The discovery of copper in the Mule Mountains west of Douglas in the late 1870s and the growth of Bisbee as one of the most important copper mining regions in the country has left a lasting impression on the region's history. Overall the County has 72 properties listed on the National Register of Historic Places. Sixteen of these listings, primarily structures and buildings, are located in Douglas. Eight other listings, also primarily structures and buildings, are located in Bisbee.

Cochise County is an area of significant scenic beauty. The contrast between the flat dessert valley floor and the mountain ranges that surround it contributes much to the character of the area. Though there are no designated scenic outlooks, the elevation of major roadways above the flat dessert valley afford uninterrupted views across miles of dessert valley floors to distant mountain ranges are visible from numerous vantage points throughout area. Disruptions to the natural beauty of these views include evidence of ongoing or past mining activities, though these areas themselves provide an interesting twist on the relationship between the history of mining and the scenic beauty of the area. For example, the abandoned Turquoise open pit copper mine, immediately adjacent to the to State Route 80 in Bisbee has a roadside turnoff with a designated Scenic outlook adjacent to the pit.

The State of Arizona, Cochise County, and the city of Bisbee Douglas have laws and ordinances in place to minimize or prevent adverse affects of new lighting sources on the night sky. The city of Douglas contributes significantly to lighting the night sky. Sections of the U.S./Mexican border are also brightly lit. Limestone mines in both the U.S. and Mexico are lit at night.

2.6 Noise

The site is an undeveloped, rural area with little ambient noise. Small engine planes from local airports contribute some level of noise. Car and truck traffic on State Route 80 is also a source of noise.

2.7 Traffic and Transportation

State Route 80 and U.S. Highway 191 are the major transportation corridors through the area. State Route 80 branches off Interstate 10 (the main road to Tucson) at Benson and runs southeast to Bisbee. At Bisbee is passes through the Mule Mountains toward the U.S./Mexican border then runs east to west roughly parallel with the U.S./Mexican border before heading northeast toward New Mexico. U.S. Highway 191 runs north to south through the center of Sulfur Springs Valley. These roads are predominantly single-lane in each direction with minimal shoulder area. State Route 80 does widen to double-lane in each direction for about a two-mile stretch outside of Douglas toward Bisbee. State Route 80 is the main road to Tucson, but because of the sparse population traffic volume on the road is generally light.

Douglas is a major U.S./Mexican border crossing and therefore a transportation node to Mexico from the United States. Pan American Drive, the entrance road from Douglas to Agua Prieta, is a modern double lane road for the about a one mile stretch between State Route 80 and the border crossing. Between 160,000 and 200,000 vehicles per month crossed the border from January 1999 to June 2000. Traffic delays on both the north and south sides of the border can occur as vehicles undergo border inspections, but there is more than sufficient roadway north of the border to accommodate backups.

2.8 Socio-economic Conditions

2.8.1 Demography

Cochise County has a population of 117,755. It is the seventh largest of 14 counties in the state. Forty-one percent of the population (47,879 people) lives in unincorporated, predominantly rural parts of the County. The largest city is Sierra Vista with a population of 37,775. Douglas is the second largest city with a population of 14,312. Bisbee is the county seat and has a population of 6,090. The small Mexican-American community of Pirtleville, which is located about 2 miles west of Douglas, had an estimated 1990 population of 1200. The population of Douglas is predominantly Hispanic (86%) or Mexican (71.6%). Population age is fairly evenly distributed amongst age groups.

2.8.2 Economic Activity

Douglas's economy has been undergoing a significant transition in its economic base over the past twenty years. Historically, mining was the major source of employment in the city. When the Phelps-Dodge Reduction Works closed in 1987 an estimated 800 people were put out of work. The Phelps-Dodge Company also moved its corporate headquarters, formerly in Douglas, out of the area. A period of high unemployment followed. Today Douglas still has the highest unemployment rate in Cochise County, but a record low of 8.3% in August 2001 is down from a high of 16% in January 1998.

Today, government is the major employer in the Douglas area. About 2800 people work in local, state, county, or federal government jobs. The recent push to curtail the entrance of illegal aliens across the border has meant an increase in the number of border patrol agents. Currently, about 500 border patrol agents are stationed at the Douglas Border Patrol station. The Arizona state prison employs just over 700 workers and Cochise College employs 835 workers.

Since the closing of the Phelps Dodge Reduction Works in the late 1980s, the economy of Douglas has become more closely connected with the growth of Agua Prieta. The official population of Agua Prieta was estimated in 1999 at 63,892 people. However,

some estimates place Agua Prieta's population at nearly 120,000 people. A jump from a population of 10,000 people just 40 years ago. This contrasts with Douglas's population, which only grew by about 4,500 people in the same period.

One reason for the rapid growth of population in Agua Prieta is the establishment of *maquiladoras*, which are American headquartered factories with manufacturing plants in Mexico near the border. The expansion of these plants, population growth, and the stability of the Mexican peso have had a positive impact on Douglas's economy. The result is that portions of Douglas's economy are closely tied to the economy of Agua Prieta and Mexico. Douglas is a major port of entry into the United States from Mexico. From January 1999 to June 2000, between 250,000 and 360,000 aliens, predominantly Mexicans, crossed the border between Mexico and the United States through Douglas every month. A large number of these entries are to purchase goods and services in the city of Douglas. An estimated 30 to 40 percent of the all retail sales in Douglas are attributable to Mexican consumers who cross the border, some on a daily basis, to purchase goods in the United States. Douglas businesses, including major national store chains such Kmart, Walmart, and Safeway have located within the first five blocks north of the border in order to cater to Mexican consumers. Clothing and apparel are the major items purchased, but there are significant sales in automobiles, auto parts, building materials, and food. Over the past seven years the growth in retail sales establishments has outpaced all other business types in the community. For some of these businesses up to 70% of all sales are attributed to Mexican consumers. In 1997, Mexican consumers spent an estimated $38 million in Douglas on retail and food purchases.

Agriculture is a significant contributor to Cochise County's overall economy. A 1997 survey of agriculture in Cochise County showed 824 farms. Of these cattle ranching was the predominant activity both in the number of farms (59% raise cattle and calves) and revenues (~$17 million). Food crops, such as sweet corn, vegetables, melons, were the second most valuable farm products in the county ($16,546,000). There is also significant cultivation of crops for animal feed.

2.8.3 Housing

The closest U.S. population center to the power plant is Douglas, Arizona. Therefore, we looked most specifically at housing in Douglas. There are 4,526 occupied housing units in Douglas. Sixty percent of them are owner occupied and 40% are rental units. The vacancy rate in the rental market is 12%. Two bedroom units with about 1100 square feet rent for about $500 per month. Though the vacancy rate is high in the existing units, to provide more high-end units to accommodate the recent increase in well paying jobs for government workers, such as border patrol agents and prison workers, the city of Douglas recently completed an 80-unit, market rate rental housing development. High end, premium two-bedroom units in this complex rent out at $695 per month. One-bedroom units rent out at $495 per month.

SECTION 3.0

POTENTIAL IMPACT OF PROPOSED PROJECT ON THE UNITED STATES

Impacts and mitigation measures are discussed below. No impacts have been determined to be significant.

3.1 Land Use

Because the project is located 7.5 miles south of the U.S./Mexican border, it has no direct impact on land use in the United States. The project's positive economic impact on the local economy in Douglas (see section 3.8) could have a secondary affect of supporting further development of retail sales outlets near the Mexican border. These potential affects fall within the long-range planning and control of Douglas's existing planning which would be able to accommodate the growth. Cochise County has also designated the area around Douglas as a Category B growth area and is projected to accommodate future growth.

3.2 Air Quality

Air quality impacts were considered for both construction and operation of the project. Construction of the Naco-Nogales Plant could contribute to fugitive dust emissions due to the disturbance of dry soils during construction. These impacts, however minor, will be limited to the construction period. The 2.2-mile access road to the site will be paved prior to major plant construction, therefore fugitive dust generated by workers commuting to the plant will not be a problem.

To assess the potential operating impacts of the project, Stone & Webster performed an independent air quality impact analysis to estimate maximum ground-level pollutant concentrations in the U. S. due to emissions from the project. The full analysis with the technical parameters used is provided in Appendix A. The purpose of the analysis was to

assess compliance with the National Ambient Air Quality Standards ("NAAQS") and Arizona Ambient Air Quality Guidelines ("AAAQGs") for hazardous air pollutants ("HAPs"). The NAAQS establish the allowable ambient ground-level concentrations for the six criteria pollutants (i.e., NO_2, SO_2, CO, PM-10, ozone, and lead) to protect public health with an adequate margin of safety and to protect public welfare. The State of Arizona has adopted the NAAQS in its regulations for the criteria pollutants and uses the AAAQGs as residential screening values for HAPs that are protective of human health. The AAAQGs are not intended for use as standards but as health-based guidelines in making environmental risk management decisions. Compliance with the NAAQS is determined by combining predicted source impacts from the project with existing or background air quality levels. Significant Impact Levels ("SILs") are also used as threshold criteria to indicate that source impacts are insignificant. If the SILs are not exceeded, then it is understood that the NAAQS are met without further consideration of background air quality concentrations. SILs are set for both Class I and Class II areas.

The results of the air quality assessment, presented in Appendix A and summarized here and in Table 2, indicate that the maximum air quality impacts in the United States produced by the project are well below EPA's Class I and Class II SILs. One minor exception is the annual NO_2 impact, which at 1.11 ug/m^3 is slightly above the Class II SIL of 1.0 ug/m^3. Because it exceeds the SIL, the concentration is added to the NO_2 background concentration (presented in Table 1) to determine compliance with the NAAQS. The highest annual NO_2[7] equals 35.11 ug/m^3 (i.e 34.0 ug/m^3 from Table 1 plus 1.11 ug/m^3 from Table 2), which is well below the NAAQS of 100 ug/m^3. These insignificant impacts demonstrate compliance with the NAAQS signifying acceptable ambient air quality in the United States. The maximum concentrations in the Chiricahua National Wilderness Area are also well below the Class I SILs, indicating insignificant

[7] Annual NO_2 impacts are assessed by applying the empirically derived NO_2/NO_x ratio of 0.75 (i.e., annual national default) to the maximum predicted NO_2 impacts, as recommended in the U.S. EPA "Guideline on Air Quality Models" (Ref. 14).

[8] Annual NO_2 impacts are assessed by applying the empirically derived NO_2/NO_x ratio of 0.75 (i.e., annual national default) to the maximum predicted NO_2 impacts, as recommended in the U.S. EPA "Guideline on Air Quality Models" (Ref. 14).

impacts in the closest Class I area. Maximum formaldehyde[9] concentrations, also shown in Table 2 below, are well below the AAAQGs, indicative of very low health risks according to the ADEQ.

TABLE 2
CCC NACO-NOGALES PEE
MAXIMUM PREDICTED AIR QUALITY IMPACTS IN THE U.S.

Pollutant	Averaging Time	Maximum Concentration[1] in U.S.($\mu g/m^3$)	Concentration in city of Douglas ($\mu g/m^3$)	Class I Area Concentration ($\mu g/m^3$)	Significant Impact Concentration		NAAQS Concentration. ($\mu g/m^3$)
					Class II ($\mu g/m^3$)	Class I ($\mu g/m^3$)	
SO_2	Annual	0.023	0.0014	0.001	1.0	0.1	80
	24 hours	0.089	0.026	0.009	5.0	0.2	365
	3 hours	0.27	0.09	0.039	25.0	1.0	1,300
NO_2	Annual	1.11	0.07	0.050	1.0	0.1	100
CO	8 hours	1.04	0.28	N/A	500	N/A	10,000
	1 hour	2.62	1.42	N/A	2,000	N/A	40,000
PM-10[2]	Annual	0.11	0.007	0.005	1.0	0.2	50
	24 hours	0.40	0.12	0.042	5.0	0.3	150
Formaldehyde[3]	Annual	0.005	0.0003	N/A	N/A	N/A	0.076
	24 hours	0.020	0.006	N/A	N/A	N/A	16.0
	1 hour	0.10	0.05	N/A	N/A	N/A	25.0

Notes:
1. The highest predicted concentrations are located approximately 17 to 19 km northwest of the plant in the Paul Spur area.
2. The PM-10 impacts include the contribution of the dissolved solids in the cooling tower drift.
3. The criteria in the NAAQS column for formaldehyde are AAAQGs.

Table 2 provides the maximum ground-level air pollutant concentrations in the U.S. predicted by adding the results of the air quality model to the highest background concentrations for Southeast Arizona obtained from Table 1 (i.e., project impact plus background). The maximum predicted impacts for PM-10 include the contribution of the dissolved solids in the cooling tower drift. The maximum impacts and background concentrations are conservatively selected for the analysis, although one violation of a short-term NAAQS is allowed. Table 2 also provides the maximum predicted concentrations in the Chiricahua National Wilderness Area federal Class I Area. These maximum concentrations are compared to the NAAQS and AAAQGs, as well as the SIL values, which are indicative of insignificant impacts that signal compliance with the

[9] Formaldehyde is a hazardous air pollutant measured for because of the project's exclusive use of natural gas.

NAAQS without consideration of background air quality. The Class I SILs are those that apply to the Class I area while the Class II SILs apply in all other areas.

The highest predicted concentrations are located approximately 10.5 to 12 miles northwest of the plant site in the Paul Spur area of Southeast Arizona.. The area is the location of a distinct hill and the site of a limestone mine near the Mexican border where the terrain elevations begin to approach and then exceed the plant stack height. The city of Douglas and the immediate vicinity, which is the closest point in Arizona to the project, is an area where the terrain elevations are approximately the same as those of the plant site. Therefore, the air quality impact in Douglas is less than that at Paul Spur, an area of higher elevation with the highest predicted concentrations.

The meteorological data used in the analysis consist of 1997-1998 hourly surface observations taken at the Douglas International Airport, located approximately 27 km north of the plant site, along with concurrent mixing heights derived from Tucson, Arizona upper air data obtained from the EPA SCRAM web site. A set of discrete receptors is also placed along the southernmost border of the Chiricahua National Wilderness Area, closest to the plant site (i.e., approximately 60 kilometers northeast of the plant), to determine the maximum Class I Area impacts. As the terrain at these Class I Area receptor points is above the turbine stack plume height, the maximum impacts are obtained. The intermediate terrain option in ISCST3 is used to assess impacts in complex terrain.

A secondary impact from the project, which is expected to have a positive impact on U.S. air quality, is the expected use of project permitting fees by the city of Agua Prieta to pave some of the currently unpaved streets. The city of Agua Prieta has been working closely with the city of Douglas, Arizona to layout and implement a plan to pave priority streets in Agua Prieta. Douglas has assisted Agua Prieta in preparing grant applications to the Border Environmental Cooperative Commission for funding. Douglas, which has its own municipal asphalt plant, has agreed to provide paving material to Agua Prieta at cost in order to extend the amount of paving in Agua Prieta as much as possible.

3.3 Water Resources

The Naco-Nogales Plant will use 150 liters per second (lps) or 3.4 million gallons per day (MGD) of water from the Agua Prieta sewage lagoons. This withdrawal takes places downstream from the U.S./Mexican border, therefore it will not negatively affect surface water flow in the United States. Water will be consumed by plant operations. The discharge to the Agua Prieta River from the plant will be 64 lps or 1.46 MGD less than what would have been discharged from Agua Prieta's sewage lagoons). Since surface water flow is not considered a significant source of groundwater recharge there will be no significant reduction in groundwater level because of the reduced discharge to the surface water. Furthermore, groundwater flow in the Silver Spring Valley and the White Water Draw/Agua Prieta River is from north to south. Finally, the plant does not use groundwater as a water source, therefore, it will not draw down the level of the aquifer.
The plant discharge will increase the concentration of Total Dissolved Solids (TDS) in the Agua Prieta River (TDS concentrations in the discharge are estimated to be 2500 mg/l), from 750 mg/l to as high as 1634 mg/l. However, because the flow of both surface water and groundwater is to the south if will have no affect on the U.S. water resources.

3.4 Flora and Fauna

The power plant will have no impact on flora and fauna in the United States because the plant is located 7.5 miles south of the U.S./Mexican border.

3.5 Historic, Scenic, Recreation, and Cultural Resources

The project will be constructed and operated in Mexico and will have no impact on the historic or cultural resources of the United States. Though located 7.5 mile from the U.S. border that Naco-Nogales plant will be visible from the United States. The topography of the land slopes gentle upwards from the U.S./Mexican border to the mountains to the south. The flat valley bottoms allow long views. The 177-foot stack will be the most

visible single element. Occasional water vapor plumes from the cooling towers will be visible during humid weather.

Despite being visible, the plant will not have a significant negative impact on the scenic quality of the surrounding landscape. There are no designated scenic outlooks that will be disrupted by the plant. Because of the distance to the plant, it will not be a prominent feature in the landscape. The nearby limestone mining operation west of the power plant site in Mexico is visible from the U.S. and is evidence of the mining activity that is part of the area's history and base of economic activity. Stacks of similar height to the power plant's both here and at the limestone mine at Paul's Spur are familiar features in the landscape. Water vapor plumes from the cooling towers will not be significant and can be expected only a small percentage of the time, since the climate is dry with an average annual relative humidity of just 35%

The Air Quality Analysis presented in section 3.2 found no significant impact on the Chiricahua National Monument or Chiricahua Wilderness Area. Therefore, there will be no impact on the quality of the recreational experience in the these areas.

3.6 Noise

Noise levels at the site boundary will be within regulated levels. Due to attenuation and the location of the project in Mexico over 7.5 miles from the border, there will be no negative impacts on ambient noise levels in the United States.

3.7 Traffic and Transportation

The project will have no impact on traffic and transportation in the United States. Fuel delivery to the site will be via natural gas pipeline. Construction workers will be made up of Mexican workers and therefore will not be using U.S. roads to a great extent. To the extent that there is increased border crossing traffic, the current infrastructure on U.S.

roads is capable of accommodating it with no significant impact. Bus transportation for workers will be provided between the Agua Prieta and the project site.

3.8 Socio-economic Impacts

3.8.1 Demography

Construction and operation of the Naco-Nogales plant will not have an impact on the Douglas or southern Cochise County population. An estimated 667 workers will be employed on site during construction. These will all be Mexican workers, most of who will reside in the city of Agua Prieta. Some specialty trade workers are expected to move to the area during construction.

3.8.2 Economic Activity

The influx of well paying jobs to the Agua Prieta area should have a positive impact on the Douglas economy. As described in Section 2.8.2 an estimated 30 to 40 percent of the all retail sales in Douglas are attributable to Mexican consumers who cross the border, some on a daily basis, to purchase goods in the United States. Many of these consumers a *maquiladora* workers with well paying jobs. It can be expected that many of the estimated 667 well paid construction workers and 66 permanent workers employed by the power plant construction and operation will travel to Douglas to shop.

3.8.3 Housing

Construction workers for the project will be housed in Agua Prieta and therefore will not affect the availability or affordability of housing in Douglas or southern Cochise County.

SECTION 4.0

CONCLUSIONS

Review of the potential environmental affects of the proposed Naco-Nogales power plant in Agua Prieta, Mexico concludes that the project will have no significant adverse environmental impacts on resources within United States. The conclusion is based on a review of potential project impacts on land use, air quality, water resources, flora and fauna, scenic, historic, and cultural resources, noise, traffic, and socio-economic conditions. The project is located 7.5 miles due south of the U.S./Mexican border and, therefore, does not affect land use or other land based resources in the United States. Air quality modeling analysis performed by Stone & Webster for the project shows that there are no significant adverse affects on air quality in the city of Douglas or other areas of the United States, including two Class I areas, Chiricahua National Monument and the Chiricahua Wilderness Area, which are located within 100 kilometers of the project. Surface water and groundwater flows south into Mexico from the United States, therefore, there are no project adverse project impacts on U.S. water resources. The project's location 7.5 miles south of the U.S./Mexican border precludes adverse impacts on historic or cultural resources, as well as on terrestrial habitat for flora and fauna in the United States. Aquatic habitat is not adversely affected because surface water flow is to the south. The project's distance of 7.5 miles from the U.S/Mexican border also minimizes any adverse affects on noise or scenic resources. During full construction the project will employ up to 667 workers. These workers will all be Mexicans who will live in the city of Agua Prieta and therefore will not adversely affect traffic, demographics, or housing in the United States. The project should have a positive impact on the economy of Douglas, Arizona due to the jobs provided for the construction and operation of the plant. Market research shows that 30 to 40% of the retail sales in Douglas come from Mexican consumers who work in well paying jobs such as those that will be provided by the project.

SECTION 5.0

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APPENDIX A

AIR QUALITY ANALYSIS

Introduction

Stone & Webster performed an air quality impact analysis to estimate maximum ground-level pollutant concentrations in the U. S., including federal Class I areas, due to emissions from the operation of the combined cycle combustion turbine power plant in Agua Prieta, Mexico. The turbines will be a source of the pollutants nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter with aerodynamic diameter less than a nominal 10 micrometers (PM-10) and volatile organic compounds (VOC). VOC emissions are a concern regarding their role as precursor pollutants to ozone formation. A wet mechanical draft cooling tower used for condenser cooling will also be a source PM-10 due to the solids in the drift emissions. The project will also be a small source of hazardous air pollutants (HAPs), primarily formaldehyde, due to the use of natural gas exclusively as the fuel.

The purpose of this analysis is to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and Arizona Ambient Air Quality Guidelines (AAAQGs) for HAPs. The NAAQS establish the allowable ambient ground-level concentrations for the six criteria pollutants (i.e., NO_2, SO_2, CO, PM-10, ozone, and lead) to protect public health with an adequate margin of safety and to protect public welfare. The State of Arizona has adopted the NAAQS in its regulations for the criteria pollutants and uses the AAAQGs as residential screening values for HAPs that are protective of human health. The AAAQGs are not intended to be used as standards but as health-based guidelines in making environmental risk management decisions. Compliance with the NAAQS is determined by combining predicted source impacts with existing or background air quality levels. The Significant Impact Levels (SILs) are also used as criteria to indicate that source impacts are insignificant and that the NAAQS are met without consideration of background air quality concentrations.

The U.S. EPA "Guideline on Air Quality Models" (Ref. 1) was consulted in selecting the appropriate methodology for the dispersion modeling impact analysis. The assessment includes: 1) a Good Engineering Practice (GEP) stack height analysis; 2) an urban/rural determination; and 3) refined modeling to demonstrate compliance with the NAAQS and the AAAGs. The EPA Industrial Source Complex Short Term, Version 3 (ISCST3) model is used for the refined dispersion analysis, including the use of the intermediate terrain option. Building downwash considerations are included in these model runs where appropriate.

Project Description

The project is a nominal 300 MW combined cycle combustion turbine power plant fired exclusively with natural gas. The proposed power plant will consist of one Siemens-Westinghouse model 501G combustion turbine with a heat input of approximately 1,800 million BTUs per hour and a heat recovery steam generator (HRSG). Condenser cooling will be provided by a wet mechanical draft cooling tower with a circulating water flow rate of 66,220 gallons per minute. The combustion turbine will exhaust via a single flue 177-ft stack with a diameter of 17 feet.

Table 1 provides stack parameters and emission rates for the combustion turbine operating at 100 percent load. The cooling tower PM-10 emissions are based on a circulating water flow rate of 66,220 gallons per minute, a drift rate of 0.002 percent of the circulating water flow, and a conservative solids concentration of 2,500 ppm, accounting for cycles of concentration. Data in this table are approximations based on vendor data for Siemens-Westinghouse model 501G

combustion turbine with a heat input of approximately 1,800 million BTUs per hour and a heat recovery steam generator (HRSG) and other information provided by the project developer. Cooling tower design information specific to this project was not available. Therefore, reasonable assumptions have been made concerning cooling tower parameters. The combustion turbine formaldehyde emissions are based on EPA's AP-42 emission factor document (Ref. 5).

Site Characteristics

The project is located approximately 14 kilometers southwest of the municipality of Agua Prieta in the state of Sonora, Mexico. Agua Prieta is just over the U.S. border from Douglas, Arizona. The project site is also approximately 35 kilometers southeast of Bisbee, Arizona and 60 kilometers southwest of the closest point to the Chiricahua National Wilderness Area, a federal Class I Area. Federal Class I lands include areas such as national parks, national wilderness areas and national monuments and are granted special air quality protections under the Clean Air Act.

The terrain in the immediate site area is relatively flat but there are hills approximately 3 kilometers to the southwest of the site that rise approximately 500 meters above the base elevation of the plant. These hills are confined within Mexico with the terrain dropping off to an elevation similar to that of the site at the U.S.-Mexican border to the north. The shortest distance to the U.S border to the north is approximately 12 kilometers.

Stack top elevation for the turbine is expected to be approximately 1,314 meters above mean sea level (AMSL). This elevation is exceeded by the terrain in Arizona at a distance of approximately 30 kilometers from the site. Therefore, the air quality impact analysis determines the maximum predicted ground-level concentrations of the criteria pollutants in the U.S. for both simple (i.e below stack elevation) and complex terrain (i.e above stack elevation).

Douglas, Arizona, which is located in Cochise County, is in the Southeast Arizona Interstate Air Quality Control Region. Cochise County is currently meeting the NAAQS (i.e., an attainment area) for ozone, NO_2 and CO. The county is in violation of the NAAQS (i.e., a non-attainment area) for SO_2 and PM-10. Ambient air quality monitoring data for southeast Arizona are available from a monitoring network operated by the Air Quality Division of the Arizona Department of Environmental Quality (ADEQ). Monitoring data on the criteria pollutants are collected at several sites within Cochise and Pima Counties. The monitoring stations that are the most representative of the area in which the maximum project impacts occur in the U.S. are the Douglas monitor (PM-10), the Tucson monitors (NO_2, SO_2, CO) and the Chiricahua National Monument monitor (ozone). The highest monitored annual and short-term concentrations (1, 3, 8, and 24 hours) for the period 1998 - 2000 are provided in Table 2 along with the NAAQS. These concentrations are meant to reflect the background air quality of the impact region in the U.S. caused by existing sources of air pollution.

Good Engineering Practice (GEP) Stack Height

A GEP stack height calculation is performed for the purpose of identifying the stack height that avoids building downwash considerations in the dispersion modeling analysis. The GEP stack height is evaluated in accordance with EPA published procedures (Ref. 2). The GEP stack height calculation is performed using the following equation:

$$H_g = H_b + 1.5\ L$$

where:

H_g = GEP stack height (m)
H_b = height of nearby building (m)
L = lesser dimension of building height or maximum projected width (m)

The GEP stack height determination is based upon dimensions of nearby buildings by reviewing a plot plan of the station and tabulating the height and maximum projected width of buildings located within five times the lesser of the building height or width from the stack. Both the height and width of nearby buildings are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind. The frontal area is the plane projection lying upwind from the stack that results in the greatest GEP height. For plane projections with multiple heights and widths, each combination of height and the lesser dimension (height or width) is evaluated for each segment of the structure to determine which one results in the greatest GEP stack height. Adjacent and nearby structures whose plane projections lying upwind from the source are overlaying and are considered as one structure. Likewise, structures that are close together are considered as one structure if their projected separation distance is less than their smallest dimension.

The GEP analysis is actually performed with the aid of the EPA "Building Profile Input Program" (BPIP, Ref. 3) which performs the calculations of the above referenced guideline using coordinates of the corners of the significant structures relative to the stack. The dominant structure associated with the combustion turbine is the HRSG. With the tallest portion of the structure (75 feet) having a length and width of approximately 40 feet, the maximum projected width (56.6 feet) is less than the height of the structure. Therefore, the GEP stack height for the turbine stack is the height of the structure (75 ft) plus 1.5 times the maximum projected width (56.6 feet) or approximately 160 feet. As the turbine stack has been designed to be 177 feet tall, it is above the GEP formula stack height of 160 ft and building downwash need not be accounted for in the modeling analysis. However, the cooling tower housing is accounted for as a building downwash structure relative to the cooling tower cell emission height, which is about 10 feet above the cooling tower deck.

Although stack height is not required by EPA regulation to be at or above the GEP stack height, being less than the GEP height requires the inclusion of building downwash effects in the dispersion modeling analysis demonstrating compliance with the NAAQS.

Urban/Rural Determination

The selection of either urban or rural dispersion coefficients and wind profile exponents for the modeling analysis is based on the land use procedures recommended in Section 8.2.8 of the U.S. EPA "Guideline on Air Quality Models", Appendix W to Part 51 dated July 1, 2000 (Ref. 1) and as described in detail in Auer (Ref. 4). The determination of those areas within the 3 km circle about the source that fall into one of the five land use types (I1, I2, C1, R2, R3) is made subjectively using topographic maps of the site area. These land use types refer varying levels of industrial, commercial and residential development.

Inspection of the site area clearly indicates that the area surrounding the CCC Naco-Nogales PEE plant is dominated by rural land use features. Therefore, rural dispersion coefficients and wind profile exponents are used in the modeling analyses.

TABLE 1

STACK AND EMISSIONS PARAMETERS

Turbine heat input: 1,800 MMBtu/hr (LHV)

Stack Parameters

	Combustion Turbine	Model Input	Cooling Tower	Model Input
Base elevation (AMSL)	4,133 ft	1,260 m	4,070 ft	1,260 m
Height	177 ft	54.0 m	60 ft	18.29 m
Exit diameter	17.1 ft	5.2 m	82 ft[1]	25.0 m
Exit velocity	83.5 ft/ses	25.5 m/sec	33 ft/sec	10.0 m/sec
Exit temperature	230 ^{o}F	383.2 ^{o}K	90 ^{o}F	305.4 ^{o}K
Volumetric flow rate	1,145,353 acfm	540.566 m^3/sec		N/A
Building Height	75 ft	22.86 m	50 ft	15.24 m
Building Length	40 ft	12.19 m	197 ft	60 m
Buulding Width	40 ft	12.19 m	66 ft	20 m

Turbine Emission Rates (100% load)	ppmvd [2] (@15% O_2, dry)	lbs/hr	tons/yr	Model Input g/sec
SO_2	1.4	5.4	23.7	0.68
NO_x	40	348	1,524	43.9
CO	6	35	153.3	4.41
PM-10	N/A	23	100.7	2.90
VOC	2.8	7.8	34.2	N/A
Formaldehyde	2.8	1.3	5.7	0.16

Cooling Tower Emissions Rate				
PM-10[3]	N/A	1.66	0.70	0.21

Notes: 1. Cooling tower exit diameter is an equivalent diameter based on an assumed 8 cells with a diameter of 29 ft each.
2. Pollutant concentrations are valid for the range of 75 – 100% load.
3. The PM-10 emission rate from the cooling tower is based on a circulating water flow rate of 66,220 gallons per minute, a drift rate of 0.002 percent of the circulating water flow, and a conservative solids concentration of 2,500 ppm.

TABLE 2

AMBIENT AIR QUALITY MONITORING DATA FOR
COCHISE AND PIMA COUNTIES

Pollutant	Averaging Interval	Highest Observed Value ($\mu g/m^3$) 1998	1999	2000	NAAQS ($\mu g/m^3$)
SO_2[1]	Annual	2.6	2.6	5.2	80
	24-hr	13.0	13.0	20.8	365
	3-hr	41.6	31.2	28.6	1,300
PM-10[2]	Annual	33.0	35.2	33.7	50
	24-hr	105.0	83.0	95.0	150
CO[1]	8-hr	4,571	4,800	5,714	10,000
	1-hr	8,914	9,714	10,170	40,000
O_3[3]	1-hr	159	161	153	235
NO_2[1]	Annual	32	34	32	100

Notes:

1. SO_2, NO_2 and CO values are the highest from among the monitoring stations in Tucson, Pima County.

2. PM-10 monitoring data are from Douglas in Cochise County.

3. O_3 monitoring data are from Chiricahua National Monument.

Refined Dispersion Modeling

Refined dispersion modeling is performed to determine the maximum concentrations in the U.S. to demonstrate compliance with the NAAQS and AAAQGs. The EPA ISCST3 model is utilized along with two years (i.e., 1997-1998) of Douglas International Airport meteorological data to predict impacts in areas where the terrain is both below stack top (i.e. simple terrain) and above stack top (i.e., complex terrain). The combustion turbine stack parameters analyzed represent operation at 100 percent operating load. A 1 gram per second emission rate is used in the refined runs to allow the scaling of the results by the individual pollutant emission rates. Annual NO_2 impacts are assessed by applying the empirically derived NO_2/NO_x ratio of 0.75 (i.e., annual national default) to the maximum predicted NO_2 impacts, as recommended in the U.S. EPA "Guideline on Air Quality Models" (Ref. 1).

The Universal Transverse Mercator (UTM) coordinate system is used to generate a Cartesian receptor grid starting at the U.S border and extending to the north, east and west as needed such that the maximum air quality impacts in the U.S are obtained. A 1-kilometer grid spacing is used as the closest distance to the U.S border from the plant is approximately 12 kilometers. Topographic elevations are assigned to each grid point using 7.5-minute U.S.G.S. topographic maps of the Douglas, Arizona area. A set of discrete receptors is also placed along the southernmost border of the Chiricahua National Wilderness Area, closest to the plant site (i.e., approximately 60 kilometers northeast of the plant), to determine the maximum Class I Area impacts. As the terrain at these Class I Area receptor points is above the turbine stack plume height, the maximum impacts are obtained. The intermediate terrain option in ISCST3 is used to assess impacts in complex terrain.

The meteorological data used in the analysis consist of 1997-1998 hourly surface observations taken at the Douglas International Airport, along with concurrent mixing heights derived from Tucson, Arizona upper air data obtained from the EPA SCRAM web site. Douglas International Airport is located approximately 27 km north of the plant site. This distance from the site supports its spatial representativeness since it places it in the same synoptic flow regime as well as most mesoscale systems. The terrain between the site and the airport is also relatively uniform.

ISCST3 modeling options are specified as follows in accordance with the EPA Guideline:

- Final plume rise
- Stack-tip downwash
- Buoyancy-induced dispersion
- Default vertical potential temperature profile
- Default wind profile exponents
- Calmpro used
- No SO_2 decay
- Regulatory default switch used
- 1-, 3-, 8-, 24-, and period averaging times used
- No flagpole receptors
- Intermediate terrain option used

Rural dispersion coefficients and wind profile exponents are used in the analysis.

Since building downwash needs to be considered for the cooling tower PM-10 emissions, direction specific building dimensions (i.e., height and width) are derived using the "BPIP" program. The direction specific building dimensions are inserted directly into ISCST3.

Results/Conclusions

The results of the refined modeling analysis are summarized in Table 3. This table provides the maximum ground-level air pollutant concentrations in the U.S. predicted by the ISCST3 model, along with the highest background concentrations for Southeast Arizona obtained from Table 2, in order to arrive at a total air quality impact (i.e., impact + background). The maximum predicted impacts for PM-10 include the contribution of the dissolved solids in the cooling tower drift. The maximum impacts and background concentrations are conservatively selected for the analysis, although one violation of a short-term NAAQS is allowed. This table also provides the maximum predicted concentrations in the Chiricahua National Wilderness Area federal Class I Area. These maximum concentrations are compared to the NAAQS and AAAQGs, as well as the SIL values which are indicative of insignificant impacts that signal compliance with the NAAQS without consideration of background air quality. The Class I SILs are those that apply to the Class I area while the Class II SILs apply in all other areas.

These results indicate that the operation of the gas-fired combustion turbine and cooling tower will result in maximum air quality impacts in the U.S. that are well below EPA's Class II SILs, with the exception of the annual NO_2 impact which is just slightly above the SIL (i.e., 1.0 $\mu g/m^3$) at 1.11 $\mu g/m^3$. These insignificant impacts are a demonstration of compliance with the NAAQS. The highest annual NO_2 impact easily meets the NAAQS when combined with the highest NO_2 background concentration. Compliance with the NAAQS indicates acceptable ambient air quality impacts in the U.S.

The highest predicted concentrations are located approximately 17 to 19 km northwest of the plant site in the Paul Spur area of Southeast Arizona. This is an area near the Mexican border where the terrain elevations begin to approach and then exceed the plant stack height and is also the location of a distinct hill in Paul Spur, Arizona. The city of Douglas and the immediate vicinity, which is the closest point in Arizona to the project, is an area where the terrain elevations are very similar to those of the plant site. Therefore, the air quality impacts in Douglas, shown in Table 4, are less than those in the maximum impact area of Paul Spur due to elevation differences.

The maximum concentrations in the Chiricahua National Wilderness Area are also well below the Class I SILs, indicating insignificant impacts in the closest Class I area. Also, the maximum formaldehyde concentrations are well below the AAAQGs, indicative of very low health risks according to the ADEQ.

TABLE 3

CCC NACO-NOGALES PEE
MAXIMUM PREDICTED AIR QUALITY IMPACTS IN THE U.S.

Pollutant	Averaging Time	Maximum Concen.[1] ($\mu g/m^3$)	Background Concen. ($\mu g/m^3$)	Total Concen. ($\mu g/m^3$)	Class I Area Concen. ($\mu g/m^3$)	Significant Impact Concentration Class II ($\mu g/m^3$)	Significant Impact Concentration Class I Concen. ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	Annual	0.023	5.2	5.20	0.001	1.0	0.1	80
	24 hrs	0.089	20.8	20.9	0.009	5.0	0.2	365
	3 hrs	0.27	41.6	41.9	0.039	25.0	1.0	1,300
NO_2	Annual	1.11	34.0	35.1	0.050	1.0	0.1	100
CO	8 hrs	1.04	5, 714	5,715	N/A	500	N/A	10,000
	1 hr	2.62	10,170	10,173	N/A	2,000	N/A	40,000
PM-10[2]	Annual	0.11	35.2	35.3	0.005	1.0	0.2	50
	24 hrs	0.40	105.0	105.4	0.042	5.0	0.3	150
Formaldehyde[3]	Annual	0.005	N/A	0.005	N/A	N/A	N/A	0.076
	24 hrs	0.020	N/A	0.020	N/A	N/A	N/A	16.0
	1 hr	0.10	N/A	0.10	N/A	N/A	N/A	25.0

Notes: 1. The highest predicted concentrations are located approximately 17 to 19 km northwest of the plant in the Paul Spur area.
2. The PM-10 impacts include the contribution of the dissolved solids in the cooling tower drift.
3. The criteria in the NAAQS column for formaldehyde are AAAQGs.

TABLE 4
CCC NACO-NOGALES PEE
MAXIMUM PREDICTED AIR QUALITY IMPACTS IN DOUGLAS, ARIZONA

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Significant Impact Concentration ($\mu g/m^3$)	NAAQS Concentration ($\mu g/m^3$)
SO_2	Annual	0.0014	5.2	5.2	1.0	80
	24 hours	0.026	20.8	20.8	5.0	365
	3 hours	0.09	41.6	41.7	25.0	1,300
NO_2	Annual	0.07	34.0	34.1	1.0	100
CO	8 hours	0.28	5,714	5,714	500	10,000
	1 hour	1.42	10,170	10,171	2,000	40,000
PM-10[1]	Annual	0.007	35.2	35.2	1.0	50
	24 hours	0.12	105.0	105.1	5.0	150
Formaldehyde[2]	Annual	0.0003	N/A	0.0003	N/A	0.076
	24 hours	0.006	N/A	0.006	N/A	16.0
	1 hour	0.05	N/A	0.05	N/A	25.0

Notes:
1. The PM-10 impacts include the contribution of the dissolved solids in the cooling tower drift.
2. The criteria in the NAAQS column for formaldehyde are AAAQGs.

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